Claims

1. A method for monitoring the mass flow of a particulate solids flow in a pneumatic pipeline (10, 12), said method including a sensing of structure-born acoustic waves;

characterized by

transforming said particulate solids flow into a free and compact solid/gas jet;

intercepting said compact solid/gas jet with a stemlike impact body (34, 34') that is axially arranged in said compact solid/gas jet so that the latter impacts onto a frontal impact surface (50, 50') of said impact body (34, 34') with substantially its whole cross-section; and

sensing structure-born acoustic waves which are generated in said impact body (34,34') by said compact solid/gas jet impacting thereon, to monitor the mass flow of the particulate solids flow in the pneumatic pipeline.

2. The method as claimed in claim 1, wherein:

said structure-born acoustic waves are sensed in one or more specific frequency ranges within the frequency range of 0 to 1000 kHz and subjected to a frequency dependent analysis to derive therefrom a value that is representative of the mass flow rate of the particulate solids flow.

3. The method as claimed in claim 1 or 2, wherein said stemlike impact body (34, 34') is isolated from the pneumatic pipeline with regard to structure-born acoustic noise.

4. The method as claimed in anyone of claims 1 to 3, wherein:

said stemlike impact body (34, 34') is arranged within a measuring chamber (16) that is connected between an upstream section (10) and a downstream section (12) of said pneumatic pipeline;

a nozzle (52) transforms said particulate solids flow from said upstream section (10) into a free, compact solid/gas jet, which axially impacts onto said impact body (34, 34') with substantially its whole cross-section; and

the particulate solids and the carrier gas that are deflected by said impact body (34, 34') leave said measuring chamber (16) to re-establish a particulate solids flow in said downstream section (12) of said pneumatic pipeline.

5. The method as claimed in claim 4, wherein the particulate solids and the carrier gas that are deflected by said impact body (34, 34') leave said measuring chamber (16) through at least one lateral outlet opening (26) laterally of said impact body (34, 34').

6. The method as claimed in claim 5, wherein:

said stemlike impact body (34, 34') has an impact head (40);

said at least one lateral outlet opening (26) is arranged laterally of said impact head (40, 40') ;

said measuring chamber (16) has a dead end (80) that is filled up with particulate solids downstream of said lateral outlet opening (26); and

said impact head (40, 40') is supported by a stem so as to protrude out of said particulate solids in said dead end (80).

7. A device for monitoring the mass flow of a particulate solids flow in a pneumatic pipeline (10, 12), comprising:

a measuring chamber (16);

an impact body (34, 34') within said measuring chamber (16); and

an inlet connection (18) designed so as to blow said particulate solids flow as a compact solid/gas jet onto said impact body (34, 34') within said measuring chamber (16), so that said compact solid/gas jet impacts onto said impact body (34, 34') with substantially its whole cross-section, said inlet connection (18) having a central axis; **characterized in that**

said impact body (34, 34') is a stemlike body penetrating into said measuring chamber (16) in axial prolongation of said central axis of said inlet connection (18), so that said compact solid/gas jet impacts onto a frontal impact surface (50, 50') of said impact body (34, 34') with substantially its whole cross-section; and

an acoustic transducer (52) is associated with said impact body (34, 34') outside of said measuring chamber (16) for sensing structure-born acoustic waves generated by said compact solid/gas jet impacting onto said impact body (34, 34'), and for converting them in an output signal.

8. The device as claimed in claim 7, further including:

signal processing means (60) for processing said output signal so as to derive therefrom a value that is representative of the mass flow rate of the particulate solids flow.

9. The device as claimed in claim 7 or 8, wherein said stemlike impact body (34, 34') is isolated from said measuring chamber (16) with regard to structure-born acoustic waves.

10. The device as claimed in anyone of claim 7 to 9, wherein said stemlike impact body (34, 34') includes:

a mounting plate (36, 36') for mounting said impact body (34, 34') in said measuring chamber (16);

a support stem (38, 38') centrally supported on said mounting plate (36); and

an impact head (40, 40') supported by said support stem (38, 38'), said impact head (40, 40') forming said impact surface (50, 50') in axial prolongation of a central axis of said inlet connection (18).

11. The device as claimed in claim 10, wherein said impact surface (50, 50') is substantially flat and perpendicular to the central axis of said inlet connection (18).

12. The device as claimed in claim 10, wherein said impact surface (50, 50') is a conical surface that is coaxial to the central axis of said inlet connection (18).

13. The device as claimed in anyone of claims 10 to 12, wherein :

said mounting plate (36) closes said measuring chamber (16) axially opposite said inlet connection (18); and

said measuring chamber (16) has a lateral outlet opening (26) laterally of said impact head (34,34').

14. The device as claimed in claim 13, wherein said measuring chamber (16) has a dead end (80) extending axially downstream of said lateral outlet opening (26).